JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2025

B. Tech. -II Semester (BT/BI)

COURSE CODE (CREDITS):24B11MA212 MAX. MARKS: 35

COURSE NAME: MATHEMATICS FOR LIFE SCIENCES-II

COURSE INSTRUCTOR: MDS MAX. TIME: 2 Hours

Note: *(a) All questions are compulsory.*
(b) The candidate is allowed to make suitable numeric assumptions wherever required for solving problems
(c) Scientific calculator is allowed.

Q.No	Question	CO	Marks
Q1	Test the convergence of the following series $$\sum_{n=1}^{\infty} \frac{1 \cdot 2 \cdot 3 \cdots \cdots n}{7 \cdot 10 \cdot 13 \cdots \cdots (3n+4)}$$	CO-1	3
Q2	Let $f(x,y)$ and $g(x,y)$ be two homogeneous functions of degree m and n respectively, where $m \neq 0$. Let $h = f + g$. If $x\frac{\partial h}{\partial x} + y\frac{\partial h}{\partial y} = 0$, then show that $f = \alpha g$, for some scalar α.	CO-2	3
Q3	Find the extreme values of the function $$f(x,y) = x^3 + y^3 - 3x - 12y + 20.$$	CO-2	4
Q4	(a) Solve $x^3\frac{d^3y}{dx^3} + 3x^2\frac{d^2y}{dx^2} + x\frac{dy}{dx} = x^3 \log x$. (b) Find the general solution of the equation $$4\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + y = e^{x/2}$$ (c) Find Laplace transform of $$f(t) = (t+3)^2 + e^{-t}\sinh 2t$$	CO-3	3+3+3
Q5	A wedding was attended by 120 guests. The distance that each guest travelled was recorded in the frequency table below Distance (miles): 0 – 10 | 10 – 20 | 20 – 30 | 30 – 40 | 40 – 50 | 50 – 60 Number of guests: 26 | 38 | 20 | 20 | 12 | 4 Calculate the Median.	CO-4	3
Q6	Calculate the standard deviation for the following data: Class Intervals: 0 - 20 | 20 - 40 | 40 – 60 | 60 - 80 | 80 – 100 Frequency: 5 | 6 | 7 | 12 | 10	CO-4	4

Q7	Using the forward difference table, determine the missing value from the following data set: x: 2, 3, 4, 5, 6 $f(x)$: 45.0, 49.2, 54.1, ------, 67.4	CO-5	3
Q8	a) A rocket is launched from the ground. Its acceleration is registered during the first 80 seconds and is given in the table below. t (sec): 0, 10, 20, 30, 40, 50, 60, 70, 80 $f(cm/sec^2)$: 30, 31.63, 33.34, 35.47, 37.75, 40.33, 43.25, 46.69, 50.67 Using Simpson's 1/3 rule, find the velocity $v = \int_0^{80} f(t)\,dt$ of the rocket at t = 80 seconds. b) Perform four iteration of the Newton –Raphson method to find the smallest positive root lies in the interval (0,1) of the equation $f(x) = x^3 - 5x + 1 = 0$.	CO-5	3+3